

RDF and Linked data – a practical introduction

Knowledge organization 2011,
Oslo, January 28

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Oslo University College

This is a translation of a presentation that was given at the conference "Days of knowledge organization" in Oslo, January 28, 2011.

The example used to illustrate a transformation from (NOR)MARC to RDF is a book of well known norwegian authors.

Tim Berners-Lee
 Date: 2006-07-27, last change: \$Date: 2009/06/18 18:24:33 \$
 Status: personal view only. Editing status: imperfect but published.
[Up to Design Issues](#)

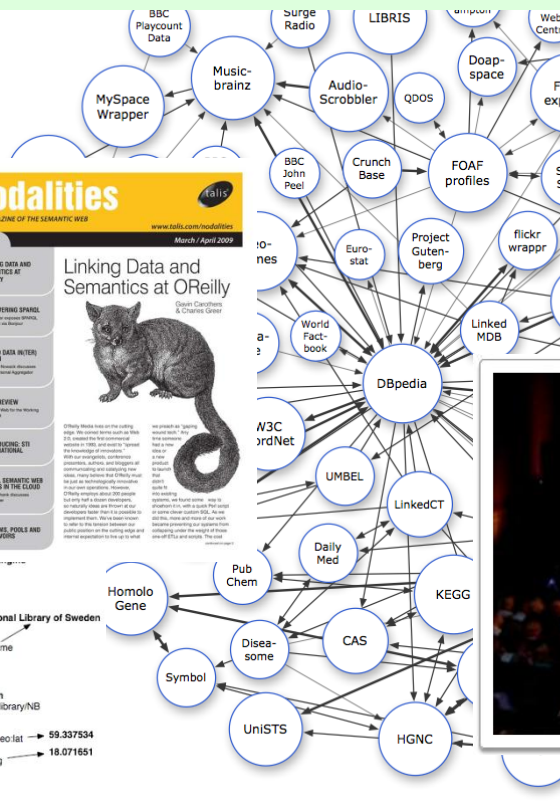
Linked Data

The Semantic Web isn't just about putting data on the web. It is about making links, so that a person or machine can explore the web of data. With linked data, when you have some of it, you can find other, related, data.

Like the web of hypertext, the web of data is constructed with documents on the web. However, unlike the web of hypertext, the relationships anchors in hypertext documents written in HTML, for data they links between arbitrary things described by RDF object or concept. But for HTML or RDF, the same expectations apply to make the web grow:

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names.
3. When someone looks up a URI, provide useful information, using the standards (RDF, SPARQL)
4. Include links to other URIs, so that they can discover more things.

Simple. In fact, though, a surprising amount of data isn't linked in 2006, because of problems with one or more of the steps. These problems, details of implementation, and factors affecting choices about how you publish your data.



W3C®

RDF Primer

W3C Recommendation 10 February 2004

This version:
<http://www.w3.org/TR/2004/REC-rdf-primer-20040210/>

Latest version:
<http://www.w3.org/TR/rdf-primer/>

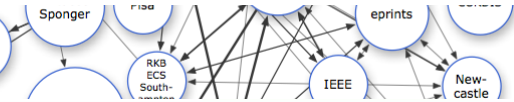
Previous version:
<http://www.w3.org/TR/2003/PR-rdf-primer-20031215/>

Editors:
 Frank Manola, fmanola@acm.org
 Eric Miller, W3C, em@w3.org

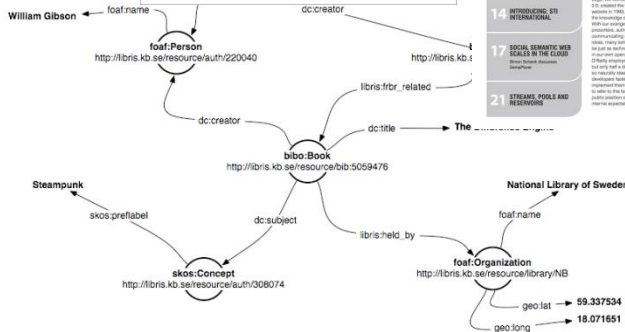
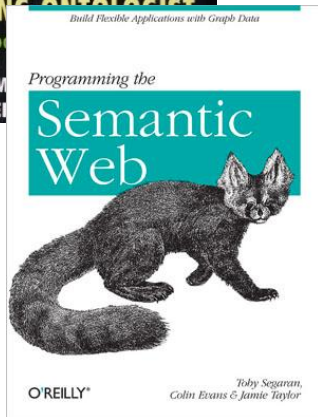
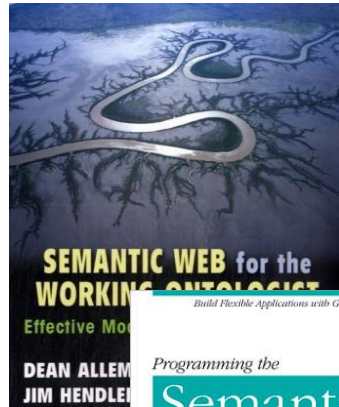
Series Editor:
 Brian McBride, Hewlett-Packard Laboratories, bwm@hplb.hpl.hp.com

Please refer to the [errata](#) for this document, which may include some normative corrections.

See also [translations](#).



As of July 2009



Dewey Decimal Classification Available languages: af | ar | de | en | es | it | fr | no | pt | ru | sv | vi | zh

300	Samfunnsvitenskap, sosiologi og antropologi	http://dewey.info/scheme/e22/
304	Faktorer som påvirker sosial atferd	

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Library of Congress Subject Headings

Collection

[Authorized Heading](#)

Heading Type

[Geographic Name](#)
[Corporate Name](#)
[Topical Term](#)

606 matches to your search

1. [Vestlandet \(Norway\)](#)
Use for *West Norway (Norway)*; *Norway, West (Norway)*
2. [Bjørøyna \(Norway\)](#)
Use for *Bjørøya (Norway)*; *Bjørøya (Norway)*
3. [Frøya \(Norway\)](#)
Use for *Froien (Norway)*; *Froyen (Norway)*
4. [Bremanger \(Norway\)](#)
Use for *Bremangerland (Norway)*; *Bremangerlandet (Norway)*



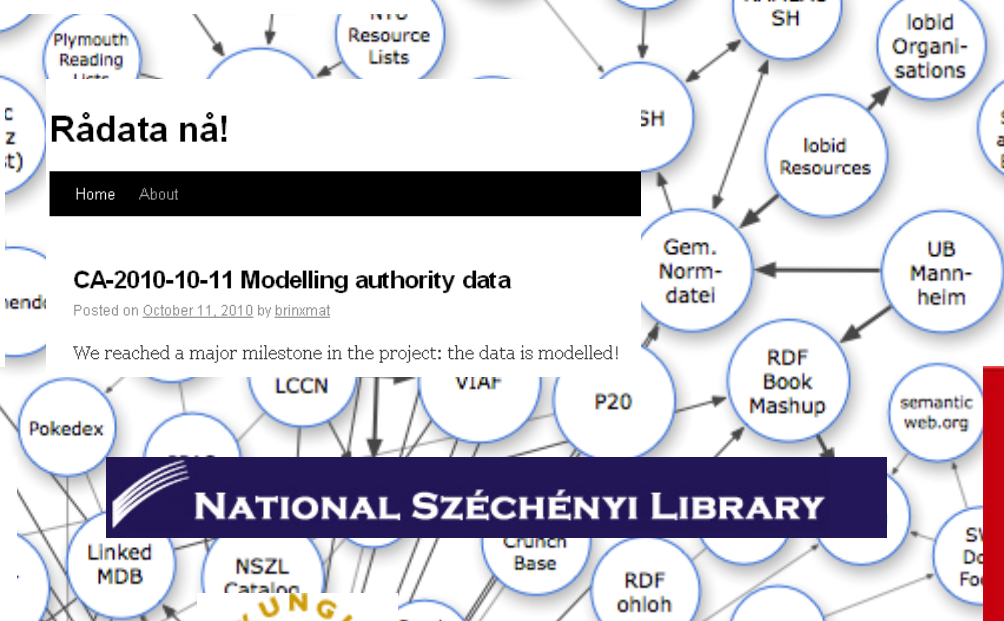
Rådata nå!

[Home](#) [About](#)

CA-2010-10-11 Modelling authority data

Posted on [October 11, 2010](#) by [brinwnat](#)

We reached a major milestone in the project: the data is modelled!



NATIONAL SZÉCHÉNYI LIBRARY



Terminology

- *Semantic web*
- *Linked data*
- *Resource Description Framework*
- *Triples*
- *Vokabularies*
- *Identifiers* (gjerne i form av en *URL*)

Starting point



Født sånn eller blitt sånn?

HARALD
EIA  **OLE-**
MARTIN
IHLE

Utro kvinner,
sjalu menn og
hvorfor oppdragelse
ikke virker

GYLDENDAL

BOKA BAK ÅRETS MEST OMDISKUTERTE TV-PROGRAM

Publisher = Gyldendal
Publication year = 2010
ISBN = 82-495-0017-2
Dewey code = 304.5
Subject heading = Arv og miljø



Expressed (simply) in MARC

*0010967486

*020 \$a978-82-05-39895-5

*082 \$a304.5

*100 \$aEia, Harald

\$d1966-

\$jn.

*245 \$aFødt sånn eller blitt sånn?

*260 \$aOslo

\$bGyldendal

\$c2010

*650 \$aArv og miljø

*700 \$alhle, Ole-Martin

\$emedforf.

9 statements

The book has the title Født sånn eller blitt sånn

The book was written by Harald Eia

The book was written by Ole-Martin Ihle

The book was published in 2010

The book was published in Oslo

The book was published by Gyldendal

The book has ISBN 82-495-0017-2

The book has dewey code 304.5

The book has subject heading Arv og miljø

9 triple statements

1	2	3
The book	has the title	Født sånn eller blitt sånn
The book	was written by	Harald Eia
The book	was written by	Ole-Martin Ihle
The book	was published in	2010
The book	was published in	Oslo
The book	was published by	Gyldendal
The book	has ISBN	82-495-0017-2
The book	has dewey code	304.5
The book	has subject heading	Arv og miljø
Subject	Predicate	Object

Subjects

The book
The book
The book
The book
The book
The book
The book
The book

Født sann eller blitt sann?

HARALD
EIA  **OLE.**
MARTIN
IHLE

**Utro kvinner,
sjalu menn og
hvorfor oppdragelse
ikke virker**


GYLDENDAL

BOKA BAK ÅRETS MEST OMDISKUTERTE TV-PROGRAM

[<http://bibliotek.no/katalog/0967486>](http://bibliotek.no/katalog/0967486)
[<http://bibliotek.no/katalog/0967486>](http://bibliotek.no/katalog/0967486)
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[<http://bibliotek.no/katalog/0967486>](http://bibliotek.no/katalog/0967486)

So far...

<<http://bibliotek.no/katalog/0967486>>
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<<http://bibliotek.no/katalog/0967486>>
<<http://bibliotek.no/katalog/0967486>>

has the title
was written by
was written by
was published in
was published in
was published by
has ISBN
has dewey code
has subject heading

Født sann eller blitt sann
Harald Eia
Ole-Martin Ihle
2010
Oslo
Gyldendal
82-495-0017-2
304.5
Arv og miljø

Predicates

*245 \$a	has the title	< http://purl.org/dc/elements/1.1/title >
*100 \$a	was written by	< http://purl.org/dc/elements/1.1/creator >
*700 \$a	was written by	< http://purl.org/dc/elements/1.1/creator >
*260 \$a	was published in	<?>
*260 \$b	was published in	< http://purl.org/dc/elements/1.1/issued >
*260 \$c	was published by	< http://purl.org/dc/elements/1.1/publisher >
*020 \$a	has ISBN	< http://purl.org/ontology/bibo/isbn >
*082 \$a	has dewey code	< http://purl.org/dc/elements/1.1/subject >
*650 \$a	has subject heading	< http://purl.org/dc/elements/1.1/subject >

Predicates

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*100 \$a	was written by	<dc:creator>
*700 \$a	was written by	<dc:creator>
*260 \$a	was published in	<dc:issued>
*260 \$b	was published in	<?>
*260 \$c	was published by	<dc:publisher>
*020 \$a	has ISBN	<bibo:isbn>
*082 \$a	has dewey code	<dc:subject>
*650 \$a	has subject heading	<dc:subject>

Predicates

Predicates: describe a type of property

Vocabularies: a set of predicates

Predicates from several vocabularies can be combined

A few well known vocabularies:

- **FOAF**, *Friend of a Friend*
- **Geo**, place coordinates
- **SKOS**, *Simple Knowledge Organization System*
- **SIOC**, *Semantically Interlinked Online Communities*

Which vocabularies should we use?

Predicates

<http://bibliotek.no/katalog/0967486> <?> Oslo

Different solutions!

Libris:

<dc:publisher>Gyldendal</dc:publisher>

British library I:

<dc:publisher>Gyldendal : Oslo</dc:publisher>

British library II:

<dc:publisher>Gyldendal</dc:publisher>

<isbd:PlaceOfPublication>Oslo</isbd:PlaceOfPublication> (forkortet utgave)

Pode:

<dc:publisher>Gyldendal</dc:publisher>

<pode:publicationPlace>Oslo</pode:publicationPlace>

Predicates

*245 \$a	has the title	<dc:title>
*100 \$a	was written by	<dc:creator>
*700 \$a	was written by	<dc:creator>
*260 \$a	was published in	<dc:issued>
*260 \$b	was published in	<isbd:PlaceOfPublication>
*260 \$c	was published by	<dc:publisher>
*020 \$a	has ISBN	<bibo:isbn>
*082 \$a	has dewey code	<dc:subject>
*650 \$a	has subject heading	<dc:subject>

So far...

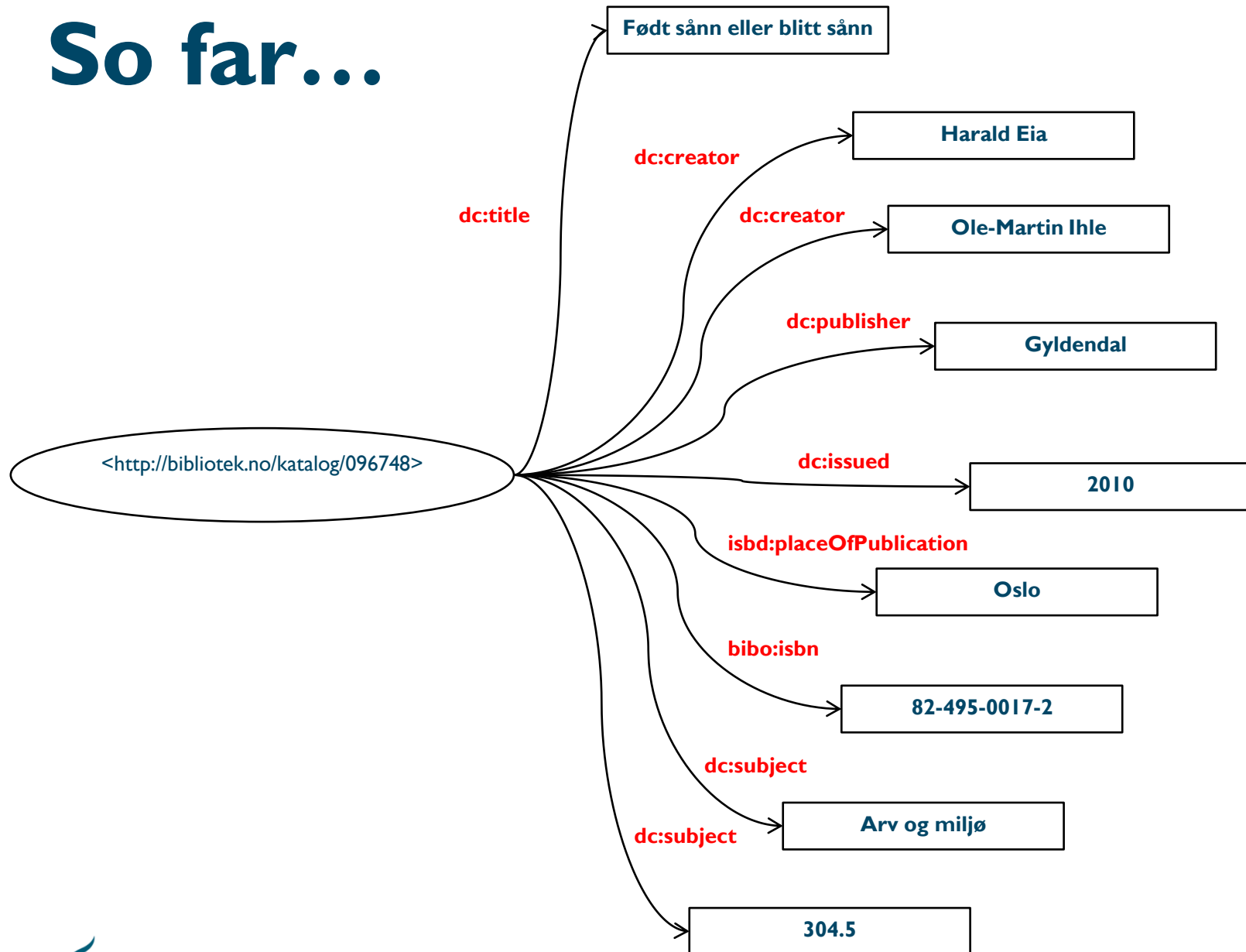
<http://bibliotek.no/katalog/0967486>	<dc:title>	Født sann eller blitt sann
<http://bibliotek.no/katalog/0967486>	<dc:creator>	Harald Eia
<http://bibliotek.no/katalog/0967486>	<dc:creator>	Ole-Martin Ihle
<http://bibliotek.no/katalog/0967486>	<dc:issued>	2010
<http://bibliotek.no/katalog/0967486>	<isbd:PlaceOfPublication>	Oslo
<http://bibliotek.no/katalog/0967486>	<dc:publisher>	Gyldendal
<http://bibliotek.no/katalog/0967486>	<bibo:isbn>	82-495-0017-2
<http://bibliotek.no/katalog/0967486>	<dc:subject>	304.5
<http://bibliotek.no/katalog/0967486>	<dc:subject>	Arv og miljø

Objects

<http://bibliotek.no/katalog/0967486>	<dc:title>	"Født sann eller blitt sann"
<http://bibliotek.no/katalog/0967486>	<dc:creator>	"Harald Eia"
<http://bibliotek.no/katalog/0967486>	<dc:creator>	"Ole-Martin Ihle"
<http://bibliotek.no/katalog/0967486>	<dc:issued>	"2010"
<http://bibliotek.no/katalog/0967486>	<isbd:PlaceOfPublication>	"Oslo"
<http://bibliotek.no/katalog/0967486>	<dc:publisher>	"Gyldendal"
<http://bibliotek.no/katalog/0967486>	<bibo:isbn>	"82-495-0017-2"
<http://bibliotek.no/katalog/0967486>	<dc:subject>	"304.5"
<http://bibliotek.no/katalog/0967486>	<dc:subject>	"Arv og miljø"

We start with a simple solution!

So far...



N3

@prefix bibo: <<http://purl.org/ontology/bibo/isbn#>>.
@prefix dc: <<http://purl.org/dc/elements/1.1#>>.
@prefix rdf: <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>>.
@prefix isbd: <<http://iflastandards.info/ns/isbd/elements#>> .
 <<http://bibliotek.no/katalog/0967486>> a bibo:Book ;
 isbd:placeOfPublication "Oslo" ;
 dc:creator "Harald Eia", "Ole-Martin Ihle" ;
 dc:date "2010" ;
 dc:publisher "Gyldendal" ;
 dc:subject "304.5", "Arv og miljø" ;
 dc:title "Født sånn eller blitt sånn" ;
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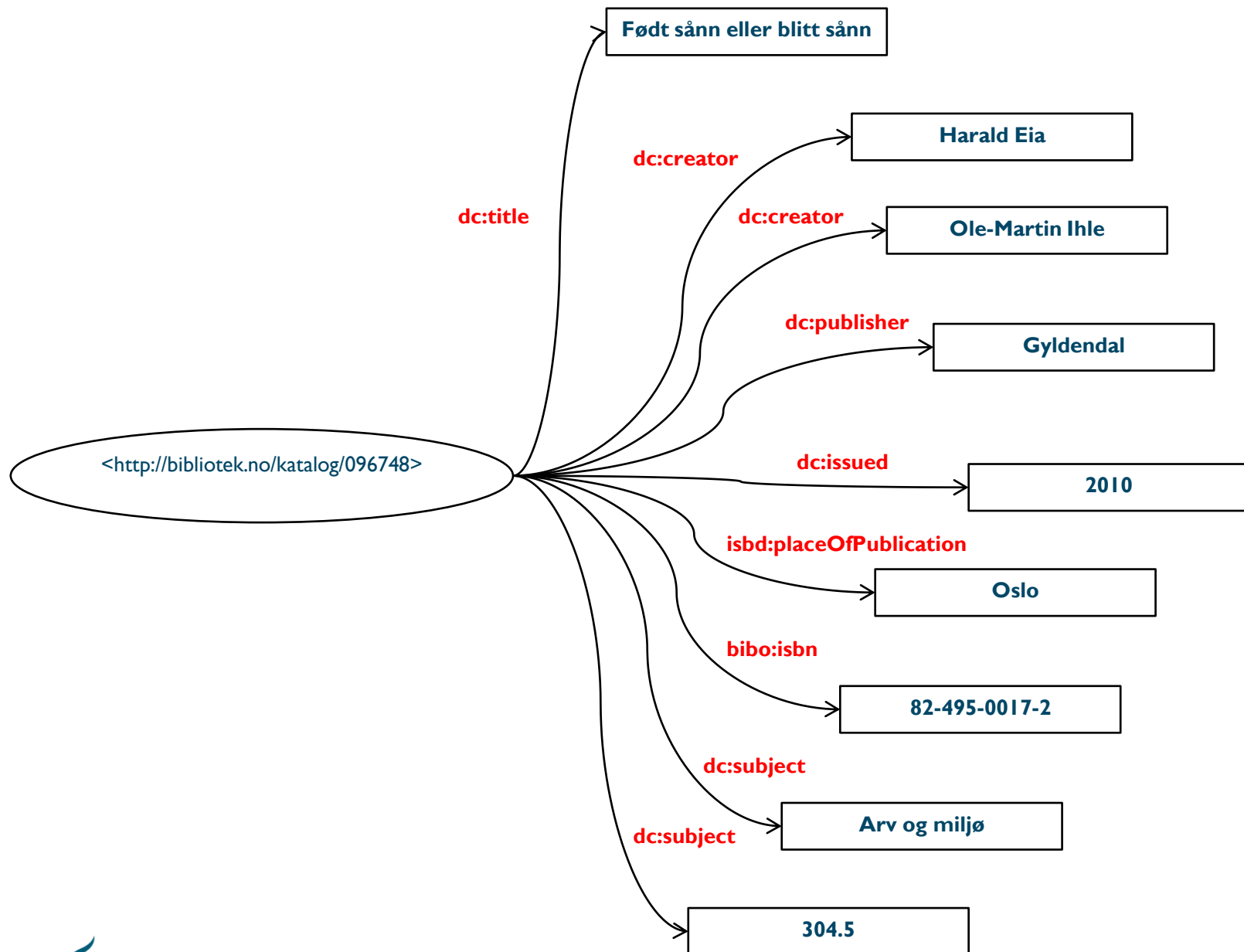
XML

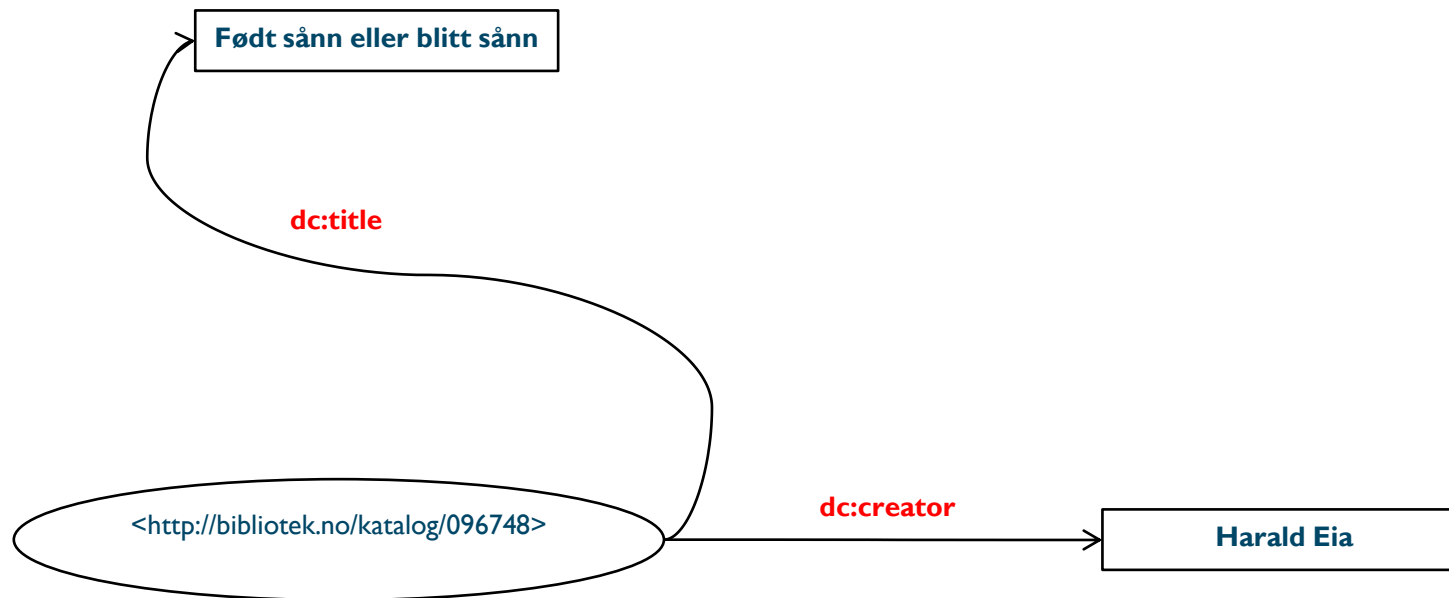
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<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:dc="http://purl.org/dc/elements/1.1#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:bibo="http://purl.org/ontology/bibo/isbn#"
  xmlns:isbd="http://iflastandards.info/ns/isbd/elements#">
  <bibo:book rdf:about="http://bibliotek.no/katalog/0967486">
    <dc:title>Født sånn eller blitt sånn</dc:title>
    <dc:creator>Harald Eia</dc:creator>
    <dc:creator>Ole-Martin Ihle</dc:creator>
    <dc:date>2010</dc:date>
    <dc:publisher>Gyldendal</dc:publisher>
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    <bibo:isbn>82-495-0017-2</bibo:isbn>
    <dc:subject>304.5</dc:subject>
    <dc:subject>Arv og miljø</dc:subject>
  </bibo:book>
</rdf:RDF>
```



Back to the beginning

- *0010967486 ✓
- *020 \$a978-82-05-39895-5 ✓
- *082 \$a304.5 ✓
- *100 \$aEia, Harald ✓
\$d1966- ✗
\$jn. ✗
- *245 \$aFødt sånn eller blitt sånn? ✓
- *260 \$aOslo ✓
\$bGyldendal ✓
\$c2010 ✓
- *650 \$aArv og miljø ✓
- *700 \$alhle, Ole-Martin ✓
~~\$emedforf.~~ ?





Statements:

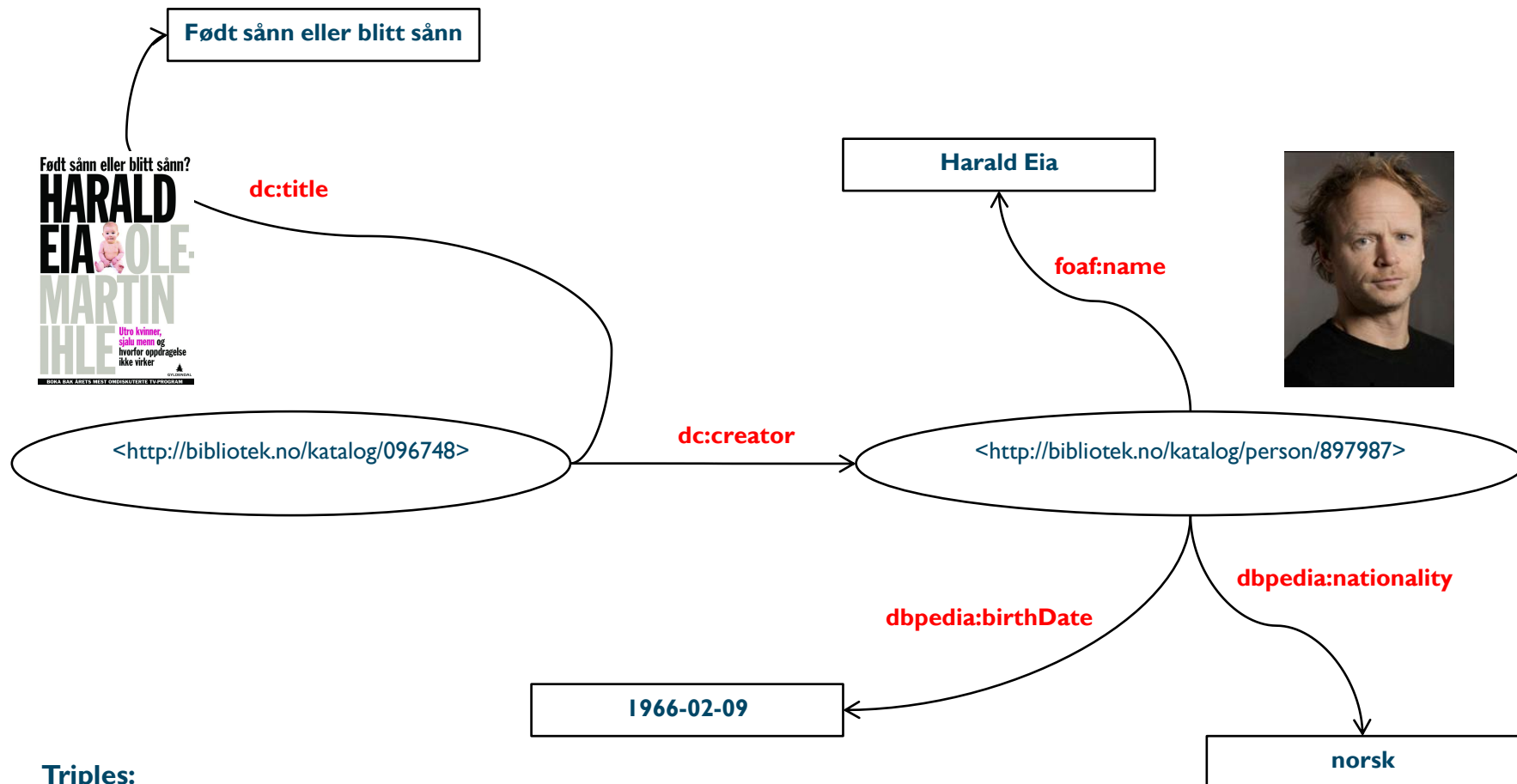
Harald Eia was born in 1966

Harald Eia is norsk

Triples:

<http://bibliotek.no/katalog/person/897987> <dbpedia:birthDate> "1966-02-09"

<http://bibliotek.no/katalog/person/897987> <dbpedia:nationality> "norsk"



Triples:

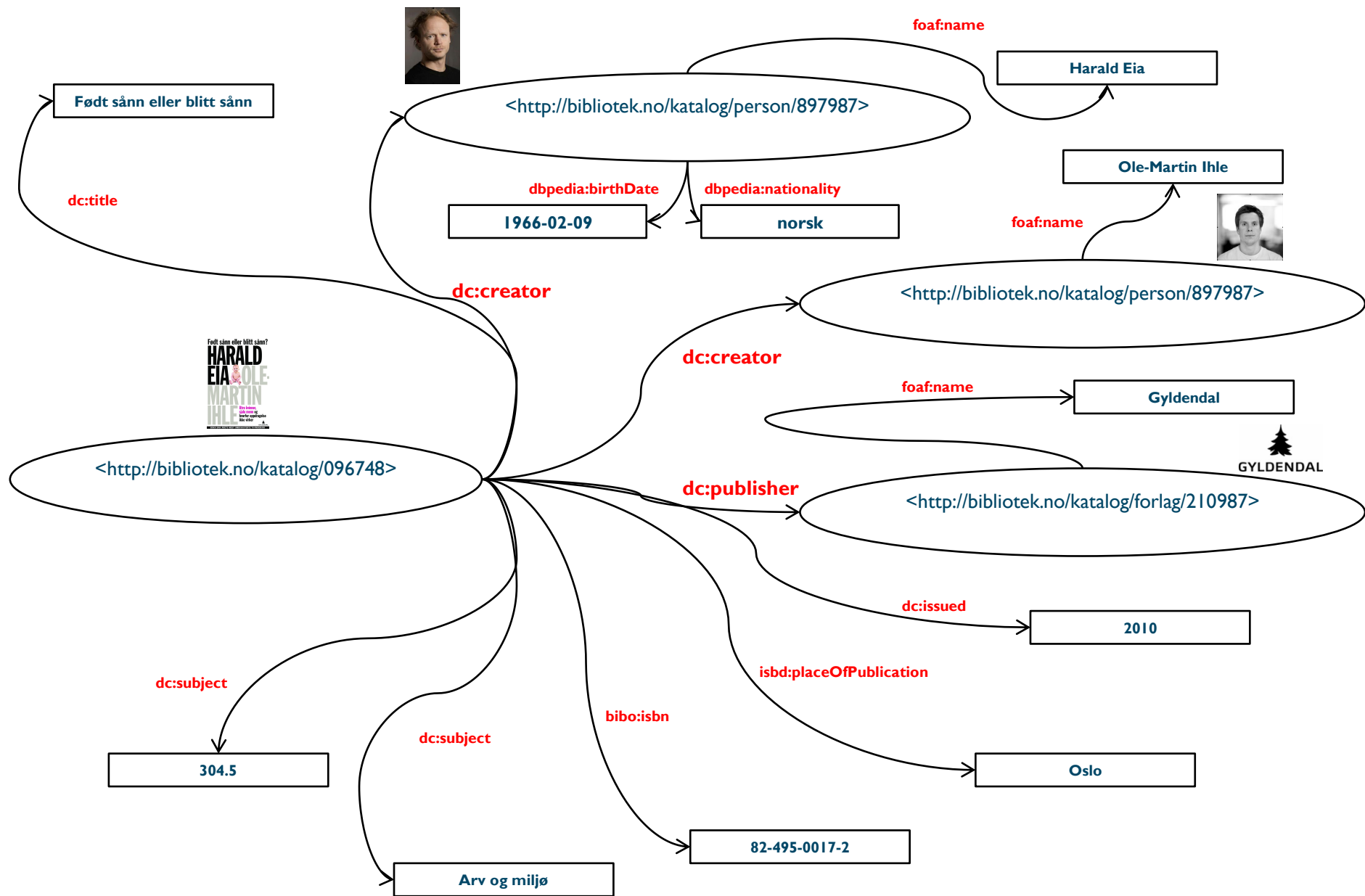
<http://bibliotek.no/katalog/person/897987> <dbpedia:birthDate> "1966-02-09"

<http://bibliotek.no/katalog/person/897987> <dbpedia:nationality> "norsk"

+ two extra

<http://bibliotek.no/katalog/096748> <dc:creator> <http://bibliotek.no/katalog/person/897987>

<http://bibliotek.no/katalog/person/897987> <foaf:name> "Harald Eia"



A norwegian discussion about subject data

From Poda project blog:
<http://www.bibpode.no/blogg/?p=1573>

4. Elise Conradi

January 14th, 2011 @ 12:51



Hmmm. Jeg er litt usikker på om jeg er enig i bruken av 082 beskrevet her. Innholdet av feltet er vel nettopp Dewey-notasjonen, som representerer et konsept (som er videre enn beskrivelsen av et dokument)? På samme måte som f.eks. innholdet i emnefeltet 650 inneholder ord som representerer et konsept? Jeg må nok bruke litt mer tid på å tenke meg gjennom dette- det er fremdeles relativt nytt for meg. 😊

Når det gjelder utforming av URI-er, kan jeg vise til en presentasjon av en som jobbet mye med dette i OCLC: Cool URIs for the DDC

<http://dcpapers.dublincore.org/ojs/pubs/article/view/932>

Vi har ikke kommet så langt i arbeidet her på huset (fokuset på dette stadiet er på selve oversettelsen), men jeg ser for meg at vi kommer til å velge en løsning som ligner på uri'ene i dewey.info og på det som gjøres i tyskland, a la:
<http://utgiver.info/ddc/class/deweynummer/...>

5. Asgeir Rekkavik

January 14th, 2011 @ 15:34



Jeg tror jeg skjønner hva du mener, og det er godt mulig det blir mer riktig sånn. Dette skal jeg se nærmere på. For et dokument klassifisert med Dewey-kode 580.9481, kan man da f.eks. få noe sånt som:

```
a bibo:Document ;  
dct:subject dewey:no_580_9481 .
```

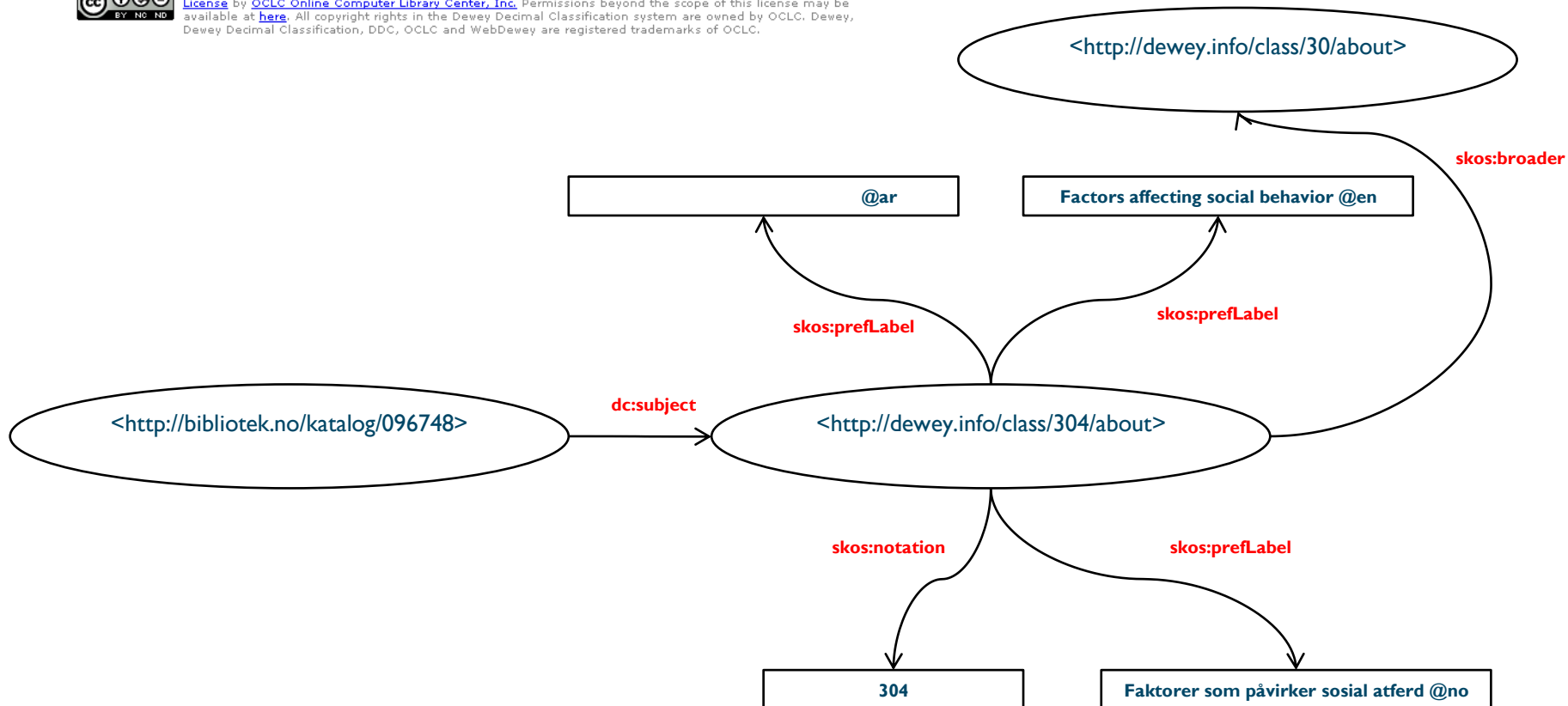
```
dewey:no_580_9481 a skos:Concept ;  
skos:notation "580.9481" .
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300 Samfunnsvitenskap, sosiologi og antropologi
304 | Faktorer som påvirker sosial atferd

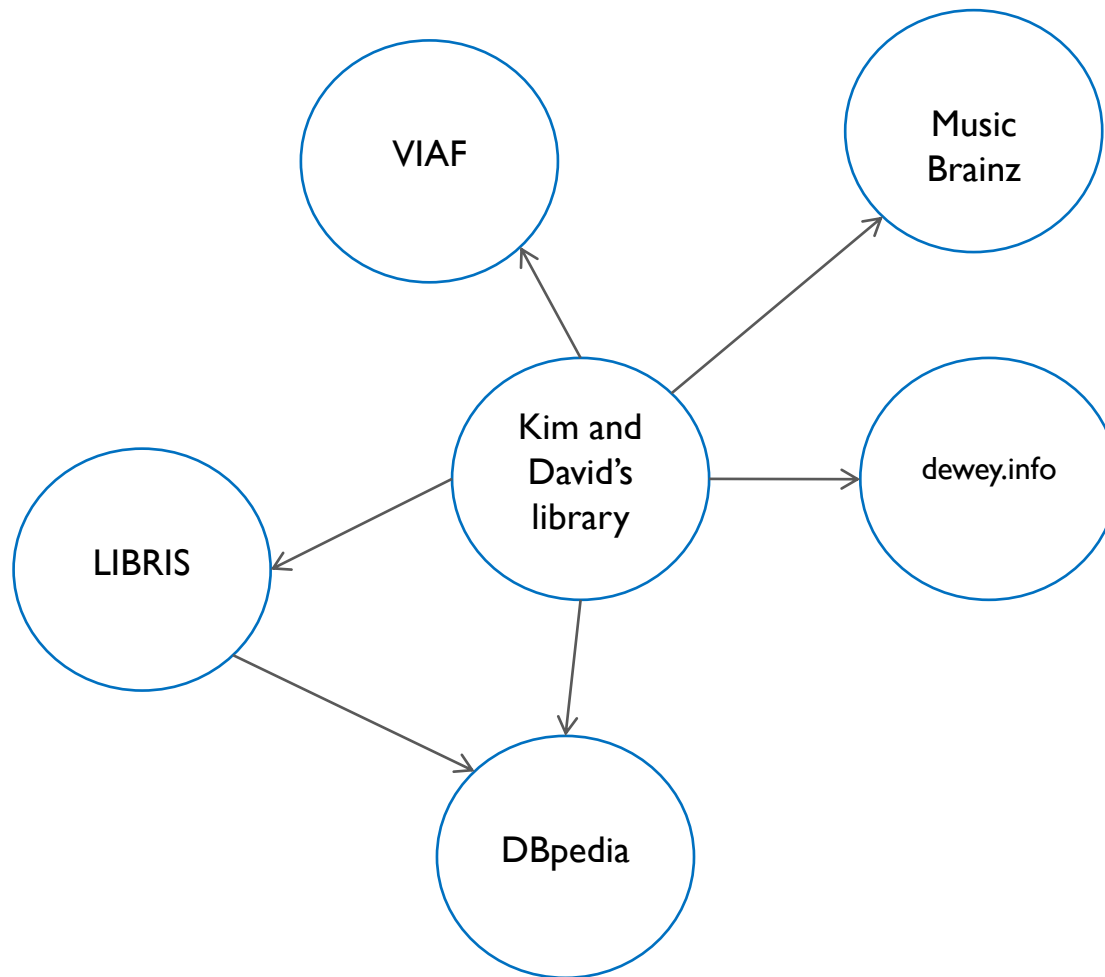
<http://dewey.info/scheme/e22/>

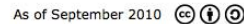


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The result?

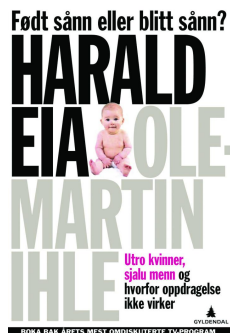




Bonus I

External possibilities: connect to other data sources

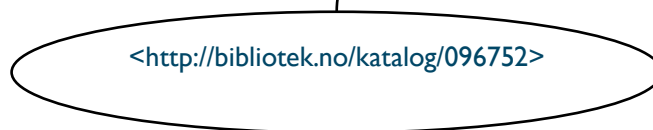
Internal possibilities:



dc:creator

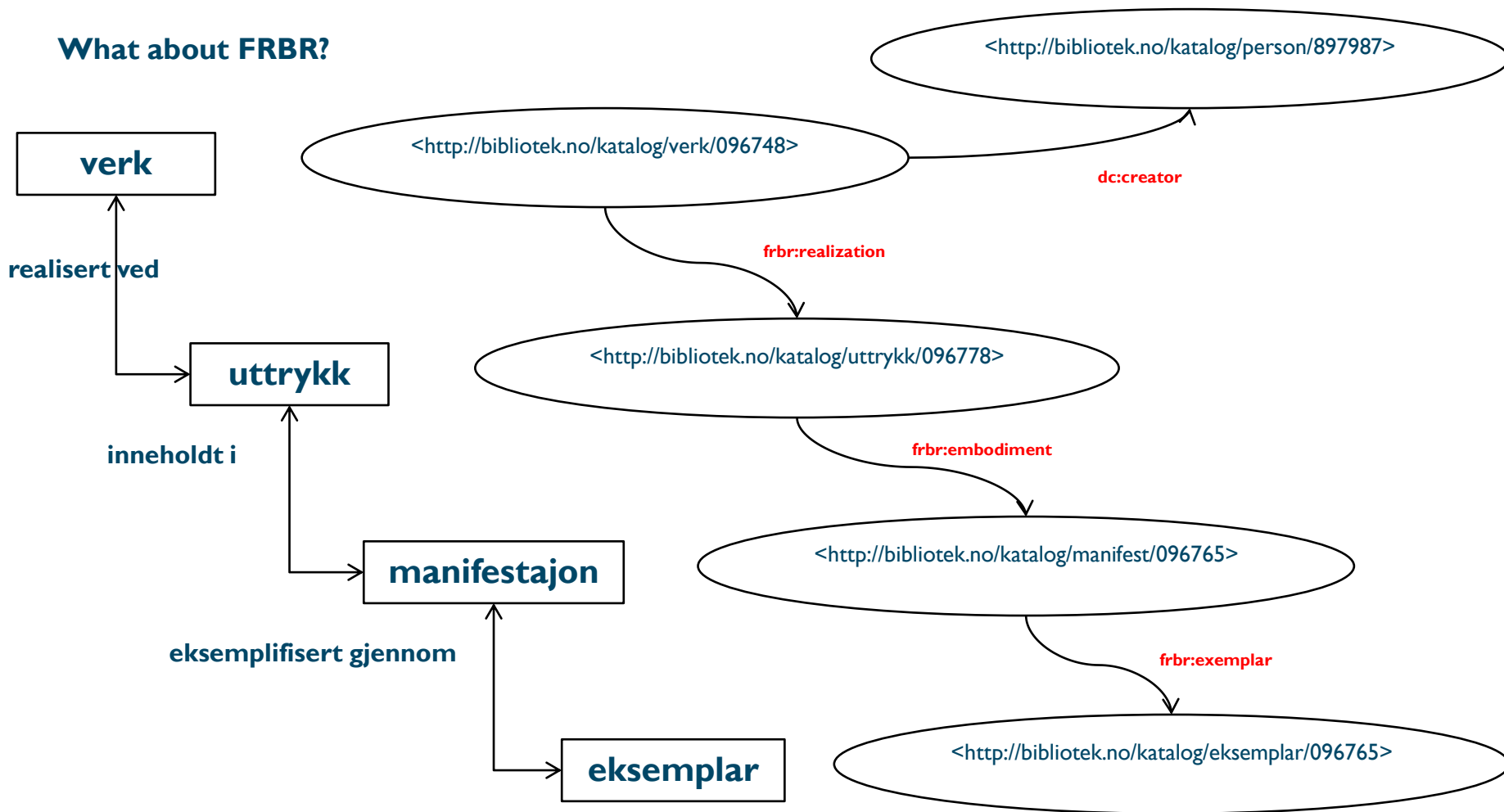


dc:subject



Bonus II

What about FRBR?



Thanks!

kim.talleras@jbi.hio.no

david.massey@jbi.hio.no